Differentiation - Trigonometric Functions

Differentiate each function with respect to x.

1) $f(x) = \sin 2x^3$

2) $y = \tan 5x^3$

3) $y = \sec 4x^5$

4) $y = \csc 5x^5$

5) $y = (2x^5 + 3)\cos x^2$

6) $y = \dfrac{-2x^2 - 5}{\cos 2x^3}$

7) $f(x) = \sin^3 x^5$

8) $f(x) = \cos(-3x^2 + 2)^2$

Differentiation - Trigonometric Functions

Differentiate each function with respect to x.

1) $f(x) = \sin 2x^3$

$f'(x) = \cos 2x^3 \cdot 6x^2$
$= 6x^2 \cos 2x^3$

2) $y = \tan 5x^3$

$\dfrac{dy}{dx} = \sec^2 5x^3 \cdot 15x^2$

$= 15x^2 \cdot \sec^2 5x^3$

3) $y = \sec 4x^5$

$\dfrac{dy}{dx} = \sec 4x^5 \cdot \tan 4x^5 \cdot 20x^4$

$= 20x^4 \sec 4x^5 \cdot \tan 4x^5$

4) $y = \csc 5x^5$

$\dfrac{dy}{dx} = -\csc 5x^5 \cdot \cot 5x^5 \cdot 25x^4$

$= -25x^4 \csc 5x^5 \cdot \cot 5x^5$

5) $y = (2x^5 + 3)\cos x^2$

$\dfrac{dy}{dx} = (2x^5 + 3) \cdot -1\sin x^2 \cdot 2x + \cos x^2 \cdot 10x^4$

$= 2x(-2x^5 \sin x^2 - 3\sin x^2 + 5x^3 \cos x^2)$

6) $y = \dfrac{-2x^2 - 5}{\cos 2x^3}$

$\dfrac{dy}{dx} = \dfrac{\cos 2x^3 \cdot -4x - (-2x^2 - 5) \cdot -1\sin 2x^3 \cdot 6x^2}{\cos^2 2x^3}$

$= \dfrac{2x(-2\cos 2x^3 - 6x^3 \sin 2x^3 - 15x \sin 2x^3)}{\cos^2 2x^3}$

7) $f(x) = \sin^3 x^5$

$f'(x) = 3 \cdot \sin^2 x^5 \cos x^5 \cdot 5x^4$
$= 15x^4 \cdot \sin^2 x^5 \cos x^5$

8) $f(x) = \cos(-3x^2 + 2)^2$

$f'(x) = -\sin(-3x^2 + 2)^2 \cdot 2(-3x^2 + 2) \cdot -6x$
$= 12x\sin(-3x^2 + 2)^2 \cdot (-3x^2 + 2)$